

TO: Board Members

THROUGH: Kevin Patteson, Executive Administrator
John Steib, Chief Deputy Executive Administrator
Robert E. Mace, Deputy Executive Administrator, Water Science and Conservation
Les Trobman, General Counsel
David Carter, Manager, Contracting and Purchasing

FROM: Ruben S. Solis, Director, Surface Water Resources Division

DATE: February 4, 2014

SUBJECT: Funding for Studies of Environmental Flows in the Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area

ACTION REQUESTED

Authorize the Executive Administrator to negotiate and execute contracts in a total amount not to exceed \$312,500 on or before August 31, 2014, for studies of environmental flows in the Nueces River and Corpus Christi and Baffin bays basin and bay area.

BACKGROUND

Senate Bill 3 (80th Texas Legislature, 2007) created a stakeholder-driven process for identifying and quantifying flows needed to maintain sound rivers and estuaries in Texas. The process calls for flow recommendations to be made by stakeholder groups and scientists representing 11 major basins in the state and their associated bays. The process next calls for the Texas Commission on Environmental Quality to develop flow standards to be applied to new water rights based on the flow recommendations and other factors. Lastly, the process contains an adaptive management component which calls for continued studies to validate and refine the environmental flow analyses, recommendations, and standards, and the strategies to achieve those standards. To date, stakeholder and science teams have been created for seven basin/bay systems; the Texas Commission on Environmental Quality has set standards for four basins/bay systems and is scheduled to set standards for three more systems by March 1, 2014; and adaptive management work plans have been submitted for six systems (Attachment A). Four remaining major basin systems have yet to be scheduled by the Environmental Flows Advisory Group for evaluation.

The Nueces River and Corpus Christi and Baffin Bays Basin and Bay Expert Science Team submitted its flow recommendations to the Texas Commission on Environmental Quality on October 28, 2011. The Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholder Committee submitted its flow recommendations on August 22, 2012. The Texas Commission on Environmental Quality is scheduled to adopt flow standards for the system by March 1, 2014.

Our Mission : Board Members

To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas

Carlos Rubinstein, Chairman | Bech Bruun, Member | Mary Ann Williamson, Member
Kevin Patteson, Executive Administrator

The Nueces Basin and Bay Area Stakeholder Committee submitted its Work Plan for Adaptive Management to the Environmental Flows Advisory Group on November 30, 2012. This work plan contains recommended studies and activities that will provide additional information for future rulemaking by the Texas Commission on Environmental Quality.

KEY ISSUES

The 83rd Texas Legislature appropriated \$2 million to the Texas Water Development Board for continued studies of environmental flows and freshwater inflows to bays and estuaries in Section 18.03 of the Appropriations Bill. The bill requires that at least \$750,000 be used for projects in the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays basin, and that selection of the remaining basins be determined by the Science Advisory Committee and approved by the Environmental Flows Advisory Group. On September 10, 2013, the Science Advisory committee recommended that the Trinity-San Jacinto, Brazos, Colorado-Lavaca, and Nueces basins be provided funding of \$312,500 each. On January 14, 2014, the Environmental Flows Advisory Group approved this funding distribution. Unexpended funds as of August 31, 2014, are appropriated for the same purpose in the fiscal year beginning September 1, 2014.

The Nueces Stakeholder committee appointed a subcommittee in the fall of 2013 and tasked it with identifying priority work plan items and developing scopes of work and scoring criteria for those studies. Over the course of several meetings, tasks were identified and scopes of work and scoring criteria were developed for the proposed studies. The full stakeholder committee approved the scopes of work, budgets, and scoring criteria and on January 21, 2014, requested that TWDB fund the projects. Staff is prepared to administer contracting of these studies.

In summary, the Nueces Basin and Bay Area Stakeholder Committee requests that four projects be funded for a total of \$312,500. Funds are requested for the following four studies:

- (a) Re-examination of the 2001 Agreed Order monthly targets and safe yield versus current demand evaluations (\$45,000),
- (b) Improve salinity modeling methods for determining environmental inflow regimes for Nueces Delta and Bay using a 3-D hydrodynamic model (\$80,000),
- (c) Explore land modifications to Nueces Bay and Nueces Delta (\$95,000), and
- (d) Nueces watershed pre- and post-reservoir nutrient budgets (\$92,500).

Final funding amounts for these studies will be determined following review of the proposals received and final negotiations with the selected contractors. For more detailed descriptions of the proposed contracted studies, please see the project summaries in Attachment B.

RECOMMENDATION

The Executive Administrator recommends approval of this item.

This recommendation has been reviewed by legal counsel and is in compliance with applicable statutes and Board rules.

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Attachment A: Summary of important dates and status of the Senate Bill 3 Process

Attachment B: Proposed studies for the Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area

ATTACHMENT A

Summary of Important Dates and Status of the Senate Bill 3 Process (as of December 3, 2013)

Senate Bill 3 Basin	Science Team Report Submitted	Stakeholder Report Submitted	Rule Adoption Date	Rule Effective Date	Adaptive Management Work Plan – Date Submitted	Adaptive Management Work Plan – Date Approved	Review Cycle	First Review of Standards (Determined by TCEQ Effective Date unless otherwise noted)
Sabine- Neches	November 30, 2009	May 20, 2010	April 20, 2011	August 30, 2012 (due to an amendment to change review cycle from 10 to 5 years)	December 6, 2010 with addendum added on August 8, 2011	September 8, 2011	5 years	September 1, 2013 **(Determined so that review will be available to planning group)
Trinity-San Jacinto	November 30, 2009	May 31, 2010	April 20, 2011	May 15, 2011	May 4, 2012	<i>Not yet approved</i>	5 years*	To be aligned with regional water planning cycle, but date not specified in work plan
Brazos	March 1, 2012	September 1, 2012	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	November 13, 2013	<i>Not yet approved</i>	10 years*	<i>Not yet determined</i>
Colorado- Lavaca	March 1, 2011	August 30, 2011	August 8, 2012	August 30, 2012	June 26, 2012	<i>Not yet approved</i>	10 years	August 30, 2020
Guadalupe- San Antonio	March 1, 2011	September 1, 2011	August 8, 2012	August 30, 2012	May 25, 2012	<i>Not yet approved</i>	5 years*	August 30, 2017
Nueces	October 28, 2011	August 22, 2012	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	November 30, 2012	<i>Not yet approved</i>	5 years*	<i>August 30, 2018*</i>
Upper Rio Grande	July 30, 2012	<i>Not yet submitted</i>	<i>To be adopted by March 1, 2014***</i>	<i>n/a</i>	<i>Not yet submitted</i>	<i>n/a</i>	<i>Not yet determined</i>	<i>Not yet determined</i>
Lower Rio Grande	July 30, 2012							

*Review cycles have not been formally adopted by Texas Commission on Environmental Quality, but rather, were recommended by stakeholder committees in their respective work plans.

** Information from 30 Texas Administrative Code, Section 298.290, Schedule for Revision of Standards,
<http://www.tceq.texas.gov/assets/public/legal/rules/rules/pdfib/298c.pdf>

*** Schedule modified by Environmental Flows Advisory Group at their January 15, 2013 meeting.

ATTACHMENT B

PROPOSED STUDIES FOR THE NUECES RIVER AND CORPUS CHRISTI AND BAFFIN BAYS BASIN AND BAY AREA

Re-examination of the 2001 Agreed Order monthly targets and safe yield versus current demand evaluations (\$45,000)

This project calls for running various modeling scenarios using the Corpus Christi Water Supply Model associated with the safe yield of the combined Lake Corpus Christi and Choke Canyon Reservoir system. The first part of the project will re-evaluate the freshwater inflow monthly targets from the 2001 Agreed Order. The second part of this project will be an evaluation of the effects of changing the monthly targets on safe yield demand versus current demand. Because demand on the reservoir system will continue to grow, resulting in less inflow to the bay as compared to the current condition, an evaluation should be conducted to determine the effects on salinity in Nueces Bay and Delta over the long term.

Section 4.1 of the Nueces Basin and Bay Expert Science Team Environmental Flows Recommendations Report (Nueces BBEST, 2011) indicates that there has been a shift in monthly freshwater inflow patterns to the Nueces Bay and the upstream reservoirs. Section 2.3 of the Nueces Basin and Bay Area Stakeholder Committee Environmental Flows Recommendations Report (Nueces BBASC, 2012) describes reservoir operations and the Agreed Order. It points out an opportunity to better manage the limited freshwater resource by reviewing new data that was not available during the creation of the 1995 Agreed Order, which is the basis for the current pass through operation of the reservoir system.

For this project, the Corpus Christi Water Supply Model will be run to insure safe yield is not negatively impacted as a result of changing the monthly inflow targets. For the demand portion of the project, the Corpus Christi Water Supply Model will be run, and model outputs will be input into the Texas Water Development Board's TxBLEND hydrodynamic and salinity transport model to examine changes in bay salinity over time. This evaluation will be brief but should confirm expected changes to Nueces Bay salinities over time as a result of Nueces BBASC freshwater inflow recommendations. Results could be helpful in determining future reservoir operation and freshwater inflow strategies.

The project will be completed by August 2015.

Improve salinity modeling methods for determining environmental inflow regimes for Nueces Delta and Bay using a 3-D hydrodynamic model (\$80,000)

This project to be completed by the Center for Research in Water Resources at the University of Texas or other qualified contractor calls for (1) evaluating freshwater pumping scenarios to maximize inundation and salinity reduction in Nueces Delta and Bay, (2) adding Nueces Bay to the Nueces Delta Hydrodynamic Model, and (3) calibrating the model with data collected by the Texas Water Development Board in 2012-13.

The Nueces Basin and Bay Expert Science Team determined that the Nueces Delta and Bay are *not* sound ecological environments (Nueces BBEST, 2011). The crux of the problem lies in knowing the

volume, distribution, timing, and duration of freshwater flows that are critical to support bay and delta habitats. Historic flood flows that maintained the delta have been reduced by upstream dams and dikes along the lower river. The freshwater pumping system that allows controlled introduction of water into the delta has the potential to restore a sound environment, but we still do not know the most effective ways to operate the pumps, *i.e.*, the flow rates, pumping durations, and times of year, that will lead to the best fresh/saltwater balance. Analyses conducted by the Nueces Basin and Bay Expert Science Team showed that existing modeling tools could not adequately capture the details of the salt/freshwater exchange in Nueces Delta and Bay. Models such as TxBLEND were designed for the larger-scale bay systems and are effective for their intended use, but were never designed for, and cannot be downscaled to, the complexities associated with the freshwater pumping and shallow wind-driven circulations in Nueces Bay. The U.S. Army Corps of Engineers, Coastal Bend Bays and Estuary Program, and the City of Corpus Christi funded development of a Nueces Delta Hydrodynamic Model as part of a feasibility study for the Nueces Basin in 2010-12. This model can be extended to Nueces Bay and applied to modeling different pumping scenarios.

This study proposes using data already collected by the Texas Water Development Board to calibrate the existing Nueces Delta Hydrodynamic Model. The model will be used to evaluate a suite of freshwater pumping scenarios to provide guidance on inundation area, depth of coverage, and freshwater fluxes to the bay. The model will be extended to cover all of Nueces Bay.

The project will be completed by August 2015.

Explore landform modifications to Nueces Bay and Nueces Delta (\$95,000)

This study attempts to maximize benefits of available freshwater inflows by better understanding the effects of landform modifications in Nueces Bay and Nueces Delta. Understanding the effects of landform modifications will also assist in protecting and constructing preferred habitats. All sources of freshwater inflows will be considered including managed events such as pumping, low volume natural or induced overbank flows, effluents, and “banked” storage releases. This study is linked to the prior priority item that calls for improving salinity modeling for determining environmental flow regimes

Deliverables from this study will include a synthesis of historic and current, proposed and implemented, landform modifications and water control structures and projects related to water management, mitigation, habitat construction, and habitat enhancement in Nueces Bay and Nueces Delta. This study will also report on the effectiveness of implemented modifications and the intended justification and benefit from non-implemented proposals. A workshop will be conducted to identify potential landform modifications or practices worthy of further evaluation. This will lead to the next project deliverable, a preliminary conceptual plan including cost estimates for projects identified in the workshop exercise. Finally, modeling exercises will be conducted to evaluate projects identified in the workshop.

The project will be completed by August 2015.

Nueces watershed pre- and post-development nutrient budgets (\$92,500)

Nutrient inputs to coastal waters are an important element in the ecology and health of estuarine ecosystems. The Environmental Protection Agency has been encouraging states to address nutrients in a quantitative manner and particularly favors establishment of numerical criteria for nutrients. The

Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholder Committee agrees that there is a potential for nutrient levels to affect aquatic plants and other biological resources and believes there is a need for a watershed approach to allow for effective management the estuary. A fundamental aspect of this approach is recognition that nutrient loading can be too high, thus degrading water quality, or too low (artificially reduced) therefore adversely affecting ecological productivity. Proper management first requires identifying whether nutrient loading is too high or too low.

This project will develop a nutrient budget based on a quantitative understanding of the natural supply of all nutrient forms and the anthropogenic changes in these supplies over time for the Nueces Bay watershed. Nutrient budgets for both the present and pre-development condition will be developed using data from an extensive network of stream gauges plus existing monitoring data contained within macro-detritus collected from the lower Nueces River, Nueces Bay and delta. Ascertaining annual loads for both the pre-development and present condition will provide a strong indication of trends and potential problems and will facilitate building consensus on a desired future condition for estuarine productivity, where chlorophyll *a* and other measures are the basis for determining desired conditions. From this point, nutrient relationships to the ecological health of the bay and appropriate cost-effective management strategies can be formulated.

The proposed \$92,500 project with the United States Geological Survey, Texas Commission on Environmental Quality, Harte Research Institute for Gulf of Mexico Studies, Coastal Bend Bays and Estuaries Program or similar cooperator and technical consultants will develop a nutrient budget for both pre- and post-development for the Nueces watershed.

The project will be completed by August 2015.

References

Nueces BBEST, 2011, Environmental Flows Recommendations Report: Final Submission to the Environmental Flows Advisory Group, Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholders Committee, and Texas Commission on Environmental Quality, Nueces River and Corpus Christi and Baffin Bays Basin and Bay Expert Science Team, October 2011, Austin, Texas, 285 p.

Nueces BBASC, 2012, Environmental Flows Standards and Strategies Recommendation Report: Final Submission to the Environmental Flows Advisory Group and the Texas Commission on Environmental Quality, Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholders Committee, August 2012, Austin, Texas, 522 p.